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REMARKS ON PACIFIC FISHES

BY

VICTOR PIETSCHMANN

BERNICE P. BISHOP MUSEUM

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HONOLULU, HAWAII
PUBLISHED BY THE MUSEUM
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Remarks on Pacific Fishes

By Victor Pietschmann

Since the publication of the comprehensive work by Mr. Henry W. Fowler (Fishes of Oceania: B. P. Bishop Mus., Mem., vol. 10, 1928), a number of undetermined fishes have been received at Bernice P. Bishop Museum. Some of them were obtained at the Honolulu Fish Market; some from various parts of Oahu, collected by Dr. C. H. Edmondson. The motor schooner *Lanikai,* fishing several times a year on the shores of the small uninhabited islands, Pearl and Hermes Reef, Laysan, and Lisiansky, brought fishes collected by Theodore T. Dranga. Small collections were sent in from outlying islands, where were working members of the Museum staff—Dr. Harry S. Ladd in Fiji, and Mr. Hans G. Hornbostel in Guam.

Four new species have been described and a number of differences and variations in fishes already determined have been noted. Many of these differences may be later recognized as characteristic of stages of growth or of local variety. It is of course impossible, with the limited material available, to make final observations. These notes are presented only as a basis for future work. I have also included remarks on some Hawaiian fishes found in old collections at the Vienna Museum, especially on an old specimen of *Hynnodus (Scepterias) fragilis* (Jordan and Jordan).

I am indebted to Bernice P. Bishop Museum for the opportunity of making these notes in connection with my work as Bishop Museum Fellow. Acknowledgment is due to many persons for their assistance in my work, especially to Miss Stella M. Jones for her assistance in arranging the descriptions in form for publishing.

Echinorhinus cookei, new species (Pl. I, fig. 1).

One adult male, 2033 mm. long. Head 5, caudal 5.2, greatest height of body 5.8, distance from tip of snout to base of pectoral 3.6, distance from pectoral base to beginning of ventral 3.7, from beginning of first dorsal base to tip of caudal 2.7, from second dorsal to tip of caudal 5.1 in total length.

Diameter of eye 10.9, interorbital same length as snout (2.5), breadth of mouth 1.8, depth of mouth 4.1, distance of nostrils 2.4, breadth of nostrils 10.4, distance from eye to tip of snout 2.4, from base of pectoral to tip of snout 5.2, length of first gill opening 4.9, of last gill opening 3.3, base of pectoral 2.9, of first dorsal 2.5, height of first dorsal (vertical distance from body to tip of fin) 4, of second dorsal 3.9, height of caudal peduncle (measured on end of base of second dorsal) 2.9, measured at beginning of lower caudal lobe 3.1, front edge of first dorsal 2, of second dorsal 2.2, of pectoral 1.6, of ventral 1.9, in head. Rear edge of pectoral 1.9, greatest breadth of pectoral 1.4 in front edge of pectoral, rear border of first dorsal 1.9, inner border of first dorsal 2.4 in front edge of first dorsal, rear border of second dorsal 1.8, inner border of second dorsal 2.5

in front edge of second dorsal, first gill opening 1.5 in last. Distance of middle front border of mouth from tip of snout 1.5 in breadth of mouth, depth of mouth (distance of middle of rear border from a line connecting both angles of mouth) 4.1 in breadth of mouth.

Form of body moderately thick, toward tail becoming more compressed, forehead flat, snout pointed, tip of snout roundish. Mouth broad, moderately curved. One row

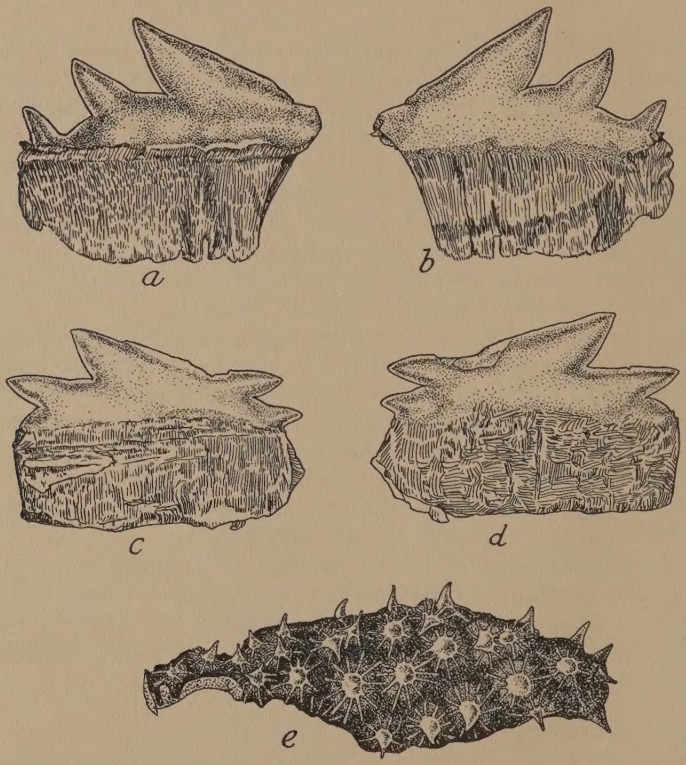

FIGURE 1.—Teeth and skin of *Echinorhinus cookei*, new species: *a*, inside; *b*, outside of upper tooth, right jaw; *c*, outside; *d*, inside of lower tooth, left jaw; *e*, skin from upper part of body, much enlarged.

of teeth in each jaw, similar, each tooth with oblique point toward angle of mouth and one to three smaller notches below point and one on inner border (toward middle of mouth). No crenulations on borders of teeth. Middle part of jaws badly preserved, impossible to determine whether any middle teeth, apparently only upper jaw has one middle tooth. Short fold around angle of mouth extending slightly on upper jaw beyond angle of mouth toward middle line. On lower jaw it reaches almost to end of outer fourth of jaw.

Nostrils about halfway between tip of snout and angle of mouth, broad with broad-based anterior flap, slightly fringed border and tip on its outer half. Posterior flap

narrow. Eyes rather large, front half before middle of mouth. Gill openings long, last two close together.

In skin are imbedded numerous small radiating scales, disconnected, making for roughness over entire body, except on lower part of snout and immediately around mouth, which parts are nearly smooth. Light-colored lateral line running over upper half of body toward caudal fin. Pectorals broad, roundly truncated behind, with nearly straight upper border. Ventrals, with almost straight border, are large and thick on base, which begins about midway between tip of pectoral and root of caudal. Ventrals with almost straight border, slightly rounded edges. Dorsals closely set, very near caudal, which is broad with only indistinctly separated lower flap. Claspers slender, extending slightly beyond rear tip of ventral fin, fully developed. Color dark coffee-brown (in alcohol faded), lighter on belly. Snout and chin dirty-whitish with indistinct, small, irregularly distributed, dark specks. Numerous round scales on skin, especially around mouth, which indicates that food consists partly of cephalopods (*Octopus*, etc.). A half-digested carangoid, *Trachurops crumenophthalmus* (Bloch) or *Carangus affinis* (Rüppell), came from mouth after specimen placed in alcohol.

South coast of Kauai, caught on board sampan, in deep water. Bought at Honolulu Fish Market, where fishermen claim never before to have seen such a shark.

I name this very interesting species after Dr. C. Montague Cooke, Jr., the distinguished conchologist of Bernice P. Bishop Museum, in appreciation of his helpful interest in my work.

Anguilla australis Richardson.

One typical specimen, about 656 mm. long (measured with difficulty because preserved in twisted position). Pectorals and anal with very narrow milk-white border (in alcohol), color repeated on lower edge of caudal in narrow band.

Malailoa, Tutuila, Samoa, in fresh water, September, 1927, P. H. Buck.

Leptocephalus marginatus Valenciennes.

One specimen, 546 mm. long. Coloration and relative measurements of body agree exactly with Günther's description (Cat. fishes in British Mus., vol. 8, p. 38, London, 1870).

Near Pearl and Hermes Reef, April, 1927.

Ophichthys (Callechelys) punctulatus (Kaup) (fig. 2).

Sphagebranchus polyophthalmus Bleeker: Nat. Tijdschr. Ned. Ind., p. 211, vol. 16, 1858-1859.

Two specimens, 194 mm. and 218 mm. long. Head 8.1 and 8.4, distance of vent from tip of snout 2.1 in total, therefore tail shorter than body. Distance of tip of snout from beginning of dorsal 6.6 and 6.2 in total length, length of snout 6 and 5.5 in head, distance of tip of snout from angle of mouth 2.4 and 2.6, distance of tip of snout from front edge of light crossband 2 and 1.9 in head. Coloring characteristic, in alcohol upper half dark pigeon-gray to brownish, belly and lower half white, under part of head darker than lower part of body, but not so dark as upper part of head. At edge of dark color is very regular row of tiny light spots closely spaced, above which is another row of spots, larger and farther apart, the one specimen containing 19 the other 17 of the larger spots. For every 2 of the larger spots are usually placed 4 or 5 of the smaller spots in

the lower row, rarely 3 or 6. In larger specimen, several spots on head are less distinct than those on smaller specimen, from which figures are made. The three spots in front of crossband are equally distinct on both specimens.

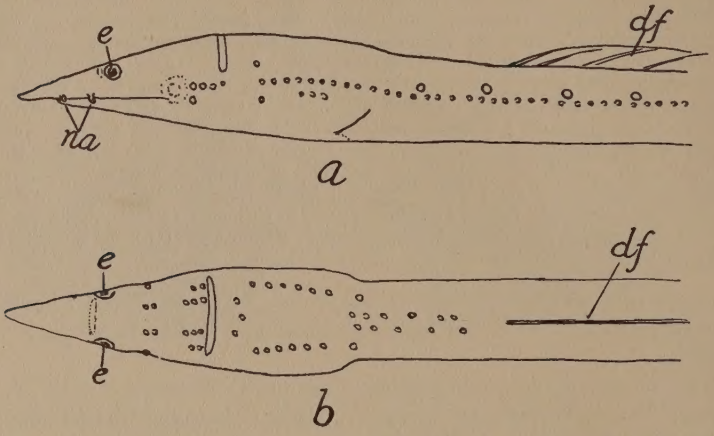

FIGURE 2.—Head and anterior part of body of *Ophichthys* (*Callechelys*) *punctulatus* (Kaup), showing distribution of light dots and streaks: *a*, side view; *b*, top view; *na*, narines; *e*, eyes; *df*, dorsal fin.

Both specimens offshore in shallow water from Hitiaa District, Tahiti, Society Islands. Collected by G. P. Wilder, who remarks that species burrows in sand, tail first.

Gymnothorax steindachneri Jordan and Evermann.

One specimen, 388 mm. long. Agrees in coloring with Steindachner's figure of *Muraena flavomarginata var.*

Pearl and Hermes Reef, T. T. Dranga.

In Bishop Museum are two casts of this species under the name *Gymnothorax kidako*, one of which is remarkable in having the black spots around the gill opening and on angle of mouth only slightly developed, also in that the black longitudinal lines on the throat, which are characteristic of both species, are very narrow and indistinct, resembling Schlegel's figure (Fauna Japonica, pl. 119, 1833). Jordan and Evermann call attention to the close resemblance of the two species. It is my opinion also that a closer relationship might well be admitted, and that all these specimens represent only color variations from one species of wide range in coloring.

Muraena kailuae Jordan and Evermann.

One specimen, 485 mm. long, richly and distinctly colored. About 20 dark crossbars with blurred borders, the first and last of which are least distinct, and indistinctly joined

with next crossbar. The spots, white in alcohol, are more numerous than in the figure of this variable species given by Jordan and Evermann (U. S. Fish. Comm., Bull., 1903, vol. 23, p. 89, fig. 21, 1905). In this respect the specimen corresponds more closely with figure of same species on plate (op. cit., pl. 9).

Ewa, south coast of Oahu, 1928, T. T. Dranga.

Cypselurus gregoryi, new species (Pl. II, *A*).

One specimen, badly preserved, total length 382 mm., body 286 mm., head 5.5 in total, 4.2 in body. Greatest height of body 5.4 in body. D. 13, A. 9, P. I 14, about 62 scales in lateral line. Shape of body peculiar to genus, long, depressed, broad back, which narrows toward belly. Greatest breadth of body distinctly smaller than greatest height (1:1.3). Interorbital slightly concave, its breadth slightly greater than diameter of eye, which equals length of snout, or 1.2, the distance of the back eye-border from back opercular border; and 3.2, the length of head. The lower jaw overlaps slightly the upper jaw. In the lower jaw only is a single row of minute pointed teeth. Total length of pectoral 1.3 in body, overlapping caudal to almost end of scales, far beyond dorsal. The distance between the anterior end of dorsal base and root of caudal a little greater than length of head (1.1) and 1.4 in distance between anterior of anal base and the root of caudal. Height of root of caudal 1.3 in head, greatest dorsal ray slightly longer than half head (1.9). Ventral extends as far as last dorsal ray but one, length 2.3 in pectoral and one-third longer than head, starting midway between rear border of eye and base of caudal. In front of dorsal are about 35 rows of scales.

Color in alcohol dark reddish-brown with bluish metallic gloss on back and upper part of body. Straight iridescent bluish band from root of pectoral backward to center of caudal peduncle, becoming less distinct toward rear. Space beneath band pure-white. Forehead and upper part of snout same color as back. Dark bluish stripe runs horizontally slightly above middle of eye to snout. Cheeks and lower parts of head white with silvery gloss. Upper part of pectoral apparently brownish in life, becoming lighter toward rear; has near its base blurred, whitish, nearly round spot. Under side of rays silvery, without points or spots. Axle of pectoral dark, almost black. Dorsal appears uniformly light, also the anal and ventral. Ventral has deep-black spot on inner side of axle, less distinct on upper two rays. Caudal dark-brown, except rays on borders, which are whitish. Specimen, judging from scales, 13 or 14 years old.

Pearl and Hermes Reef.

This species is closely related to *Cypselurus atristrigis* Jenkins, from which it differs decidedly in the longer pectoral and longer ventral and in the difference in coloring. A very large number of species have been described in the last twenty or thirty years from the family Exocoetidae, this I believe is due to the fact that only one or a few specimens have been used for each determination, and those from widely distributed localities; whereas had ample material been available for examination, it doubtless would have been found that each true species has wider variation in coloring and form than is now believed. This is made probable by the wide distribution of the species of this family and their easy method of locomotion.

I have named this species for Professor Herbert E. Gregory, who maintained an unfailing interest in my work in the Pacific.

Ptenonotus melanogeneion, new species (Pl. II, *B*).

One specimen, 153 mm. long. Height of head 4.4, caudal 4.5, height of body 4.8, distance from tip of snout to beginning of dorsal base 1.5, to beginning of anal base 1.8, of dorsal 2.6, of anal 4.8 in body. Diameter of eye 3.2, interorbital (above middle of eye) 4, length of snout (from tip of lower jaw) 4.8 in head. In lateral line 44 scales. D 12, A 13, P 12, V 6.

Almost directly behind the 38th scale, the lateral line becomes quite indistinct. Scales thin, deciduous, cover also basal third of caudal.

Shape of head and body corresponds to genus; strongly compressed, becoming narrower toward belly. Lower jaw distinctly overlapping upper, both without teeth. Large rectangular patch of very minute teeth on vomer, broad band of same teeth on palatines. Mouth much protracted. On chin, immediately behind middle of lower jaw, two barbels, close together at base. In basal half barbels are thin and broad, bandlike, gradually decreasing in width a little short of center, last third filiform; tip enlarged to thin flap reaching a little short of front border of eye. Eyes larger than snout, interorbital broad, flat, covered with large scales. Opercle and preopercle with smooth borders. Pectoral strongly falcated, first ray simple, others divided. The second, the longest, reaching distinctly behind end of ventral about to fifth anal ray. Ventral inserted just before end of second third of pectoral, first and second ray about half length of third, which is the longest and reaches to second anal ray. Dorsal strongly elongate with straight upper, deeply notched rear and slightly curved inner border. Notch of rear border formed by two last rays. First, second, and third rays simple, much shorter than fourth, which is longest and reaches almost to middle of upper border of caudal. Anal begins below base of dorsal. It is comparatively short, with nearly straight borders. Lower lobe of caudal twice the length of upper.

Color (in alcohol) silvery with light bluish sheen toward belly, becoming whitish. Upper third of body and neck and forehead chestnut-brown, darker on top. The two barbels deep brownish-black. Base of dorsal white, protruded portion blackish, tip deep-black. Also last quarter of ventrals black. Base of anal white, remainder of fin blackish-brown. Pectoral and caudal light.

Kona, Hawaii, 1927, T. T. Dranga.

The species *Ptenonotus melanogeneion* differs from *Ptenonotus cirriger* (Peters) in the comparatively higher body, the form and color of barbels, and the length and shape of fins, especially dorsal and ventral. Unfortunately, in the preliminary note (Anzeiger Akad. Wissensch, Wien, 13, Dez., 1928), the measurements for length of head and diameter of eye are not interchanged.

Ichthyocampus edmondsoni, new species (fig. 3).

One specimen, about 95 mm. total length, D. 20, rings 14+38, P. 10, C. 6. Height of body about equals breadth. Body angular, heptagonal, merging into four less prominent edges at abdomen, length of body 2.2 length of snout to vent. Eye moderately large, its diameter 2.3 in length of snout, exactly 6 in length of head. Operculum roundish, convex and has on base only short onset of a middle keel; dorsal keel sharp and distinct, running obliquely upward and backward. Surface roughened by roundish protuberances, neither banded nor radiating. Only six rays can be counted on a very small caudal. Color in alcohol brown. Thirteen distinct white crossbands with notched edges over back and sides, each edge bordered with dark-brown bars one and one-half to two times size of crossbands. In interspaces between these dark crossbars is an indistinct light cross stripe (12 in all). Middle three white crossbars, with bordering bars extending part way onto belly, which is white. First brown crossband lies behind head, least distinct, with only narrow border on each side.

Waikiki Reef, Honolulu, 1927, C. H. Edmondson.

The species is distinguished from any hitherto described, principally by its striking coloring, also by the number of pectoral rays and by its rings. I

FIGURE 3.—*Ichthyocampus edmondsoni*, new species. (Drawn from the type specimen.)

name the species for the Zoologist at Bernice P. Bishop Museum and Director of the Marine Biological Laboratory of the University of Hawaii, Dr. C. H. Edmondson, who has been very helpful to me in my work.

Microphis brachyurus (Bleeker).

Three specimens, 92 mm., 98 mm., and 115 mm. long. All have a high number of rings, the largest specimen 22+25—one caudal ring more than reported by Weber and Beaufort as highest number for this species. In each specimen the number of subdorsal rings is 1 + 8. Length of snout in head 1.6, postorbicular part of head 2 to 2.4 in length of snout, length of caudal 3 to 3.8 in head, in smallest specimen slightly longer than postorbital length of head. Tail (exclusive of caudal) 1.6 to 1.7 in length of trunk. Color differs somewhat from description of Weber and Beaufort. A narrow, white border around each nostril is remarkable. White spots on snout agree with description of Weber and Beaufort (The fishes of Indo-Australian Archipelago, vol. 4, pp. 43, 44, fig. 21, Leiden, 1922). Largest specimen has small but distinct, yellowish-white dots on border of each ring, one row immediately above ventral crista. The first two rows are visible also above and below inferior crista of tail. In two smallest specimens are several blurred, light rings, the first crossing behind base of dorsal, the second about middle between this and root of caudal, the third slightly in front of caudal. On sides of body are two similar whitish spots, one approximately below middle of dorsal, the other in front of dorsal.

Papara District, Tahiti, Society Islands, G. P. Wilder. In fresh water stream, but reported by Wilder also in salt water.

Weber and Beaufort (op. cit.) state that the number of rings on this widely distributed species differs largely. The number on these three specimens is almost the same. I believe that it may be possible to trace through a statistical study of rings on a large number of specimens from various localities several local races, as was done for European Syngnathidae.

Naucrates ductor (Linné).

One specimen, 343 mm. in total length, 264 mm. length of body. D. XI, I/27, anal I, I 16. Color of caudal remarkable, both outer tips clear-white, sharply contrasted with dark color of remainder, which is almost black, intensified at end of fin. Near base of forepart of dorsal are whitish spots, in addition are sharply contoured white spots along rays of second half of fin. On border a hardly visible lighter longitudinal band.

Pearl and Hermes Reef, T. T. Dranga.

Decapterus sanctae helenae (Cuvier and Valenciennes).

One specimen, 184 mm. long. Midway on body faint traces of yellowish metallic gloss.

Guam, 1926, H. G. Hornbostel.

Jordan and Evermann (U. S. Fish., Comm., Bull. 1903, vol. 23, p. 186, 1905) list as two distinct species *D. sanctae helenae* (Cuvier and Valenciennes) and *D. pinnulatus* (Eydoux and Souleyet), the determining factor being coloration. I believe that this separation is needless, inasmuch as the coloring is not of sufficient importance to justify it, particularly in view of the fact that the colors in either species are not constant. I agree therefore with Fowler's opinion (B. P. Bishop Mus., Bull. 26, p. 15, 1925) and that of Steindachner and Günther. Living on the surface of the water and being excellent swimmers, this species is consequently of wide distribution, but it is possible that several local varieties may be found through the examination of ample specimens from different localities. Jordan and Evermann (loc. cit.) show under plate 30 the legend "Decapterus sanctae-helenae (Cuvier and Valenciennes). Type of D. Canonoides Jenkins." In the text it is noted as the figure for *Decapterus pinnulatus* (Eydoux and Souleyet).

The relative length of the pectoral fin in Jordan and Evermann's plate 30 differs greatly from that of a specimen, 490 mm. long, exhibited as a cast in Bishop Museum. On the other hand, the pectoral length of this Guam specimen is about the same as that shown in Jordan and Evermann's plate 30. These variations, therefore, may be due only to differences in age of the specimens (in the larger specimens the pectoral length is relatively longer than in younger ones) and do not justify a division into two distinct species. Similar variation in pectoral length, according to age, is noticeable in other specimens in the Museum's collections. Jordan and Seale ([U. S.] Bur. Fish., Bull., 1905, vol. 25, p. 229, 1906) describe a new species of *Decapterus* under the name *D. lundini.* The figure to which the text refers (op. cit., p. 230) represents another fish; for the figure has no separated dorsal and anal finlets, and the soft dorsal and anal are uninterrupted. Evidently the figure represents a species of *Trachurops,* closely related to *Trachurops crumenophthalma* (Bloch).

Carangoides gymnostethoides Bleeker.

One specimen, 233 mm. long. Dorsal VI, I/35, and II, I/29, head 4.7 in total, 3.5 in body, greatest height 3.7 in total, 2.7 in body, equals length of caudal. Ventral 2 in head, 2.7 in pectoral, 2.5 in distance from tip of snout. Coloration in alcohol above a metal-like light-blue with purplish lights, on sides uniformly silvery. Without spots.

Pearl and Hermes Reef, T. T. Dranga.

Amia (Foa) fo Jordan and Evermann.

One young typical specimen. Total length 25 mm. In the caudal fin are 6+17+4 rays visible; in anal fin II/9. Lateral line extends over first 8 rows of scales, behind which are 14 additional scales. Length of caudal 2.7, height of body immediately in front of first dorsal 2.3, length of head 2.2 in body. Snout 5.5, diameter of eye and breadth of interorbital 4.1, length of pectoral 1.7, longest anal ray, which is equal to longest ray in

second dorsal, 2, caudal 1.2 in head. Coloring almost identical with description and figure of Jordan and Seale ([U. S.] Bur. Fish., Bull., 1905, vol. 25, p. 248, 1906). Black patch on border of first dorsal very distinct and extends in this specimen to almost half across fin. Second dorsal, anal, and caudal white.

The relative variation of the dimensions between this specimen and those described by Jordan and Seale may be explained by the difference in age. The species *Foa vaiulae,* described by Jordan and Seale also from Samoa (op. cit., p. 249, fig. 43) from one specimen, I believe to be a faintly colored individual of the species *Amia fo.* My reasons for stating this opinion are: that the dark color on the neck and snout has, according to the author's figure, the same position and dimension as the specimen I have examined, and has the dark spot on the gill cover; also the black spots on border of first dorsal are similar to those in *Amia fo,* although they have not the same relative dimensions, which is to be expected in a less highly colored individual. Indistinct bars on caudal are similar in both. The former genus, *Apogon* (now *Amia*), was divided by Jordan and several other authors into several genera, based upon most minute differences. I do not believe that this classification is justified by facts, since the variations—especially differences in the lateral line, which appear on some species as a mere interruption, on others appearing only on the front part of the body—would seem to call for classification as subgenera only. Moreover, many specimens show a tendency to overlap in this feature. The descriptions and the figures of Jordan and Evermann listing several species of *Amia* (U. S. Fish Comm., Bull., 1903, vol. 23, 1905) do not correspond in the number of fin rays in dorsal and anal. On page 210 the authors describe *Mionorus waikiki* [sic.] "D 8 soft rays, A 7." Plate 35 shows in each dorsal and anal 9 soft rays. On page 211, they note for *Foa brachygramma* (Jenkins) "A. 8 soft rays"; the figure shows 7. On page 214, for *Amia snyderi* (Jordan and Evermann) "D. 9 soft rays"; while the figure shows 10, plate 36 shows 8.

East shore of Kaneohe Bay, Oahu, on an iron wreck in shallow water, covered with algae and Bryozoa. V. Pietschmann. Previously known only from Apia, Samoa.

Amia novemfasciata (Cuvier and Valenciennes) (fig. 4).

Apogon aroubiensis Hombron and Jacquinot: Voyage au Pole Sud, Poiss., p. 31, pl. 1, fig. 1.

Amia exostigma Jordan and Starks; Jordan and Seale: [U. S.] Bur. Fish., Bull., 1905, vol. 25, p. 238, fig. 31, 1906.

Eleven specimens 21 mm. to 70 mm. long. Length of caudal 4± (3.8 to 4.4) in total, 1 to 1.3 in head; head 2.2 to 2.8 in body, greatest height of body, slightly before beginning of first dorsal, equal length of head or slightly smaller (1 to 1.4, most specimens 1.1 to 1.2); greatest height of body 2.3 to 3.5 in length of body. Relative height of body increases in older specimens, so that larger specimens are distinctly higher than young ones. Snout[1] 4 to 4.7, diameter of eye 2.7 to 3, interorbital (in 3 specimens) 4 to 4.3 in

[1] This and the following measurements are taken from only 6 specimens.

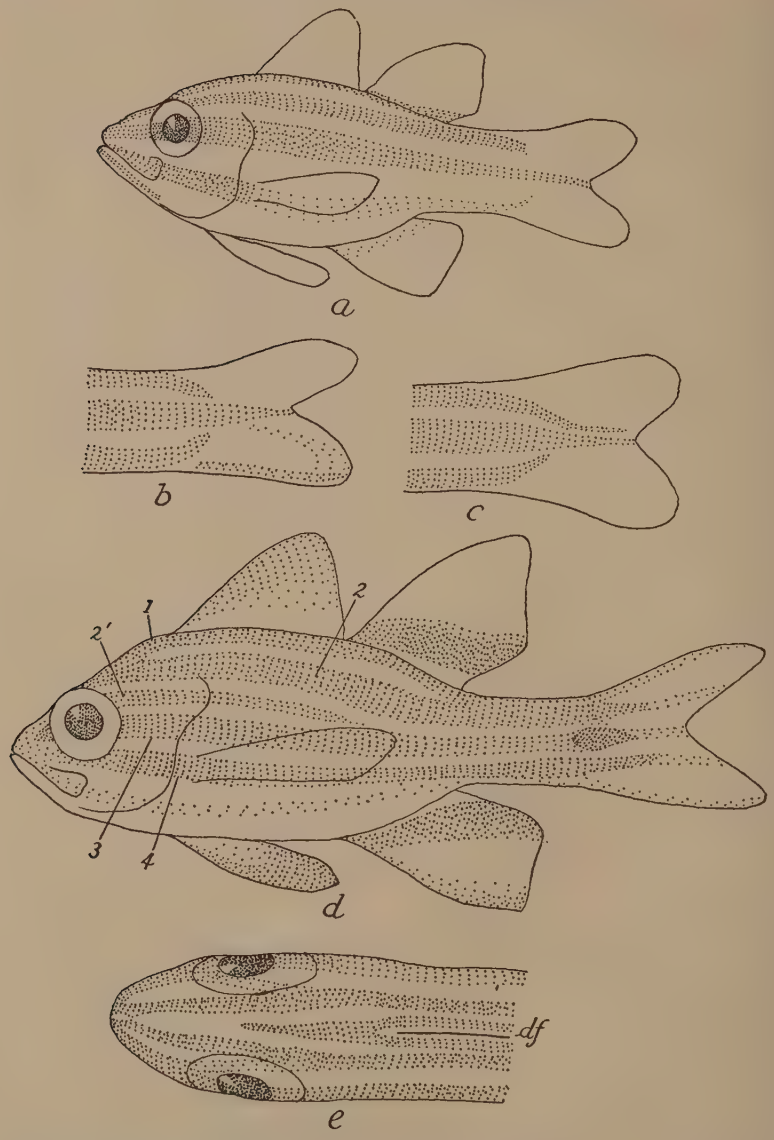

FIGURE 4.—*Amia novemfasciata* (Cuvier and Valenciennes), showing variation in color arrangement: *a-d*, side views; *e*, top view; *df*, dorsal fin; 1, 2, 2′, 3, 4, color bands. Length of *a*, 21 mm.; of *b*, 70 mm.

head. Length of pectoral distinctly smaller than length of head (1.3 to 1.9), most specimens 1.5. Length of base of anal (in 5 specimens) 2.5 to 2.7 in head.

Coloring greatly variable. In brighter specimens black bands are narrower than interspaces, also less distinct. In dark-colored specimens bands are sharply defined. In one specimen on front part of body is an additional band between second and third longitudinal bands (fig. 4, *d*, 2), all bands are more deeply black, longer, and broader: three center bands continued on caudal, forming black seams, and upper and lower border of caudal edged with dark. In most specimens the two lowest bands are less distinct and not so dark as the upper bands; especially the fifth band is in several specimens visible only on chin, forming there a short, narrow dark stroke. On the single specimen (fig. 4, *d*) the middle band is also intensive on root of caudal, so that it forms an oblong, dark spot. In coloring of fins are remarkable differences: in dark-colored specimen (fig. 4, *d*) more than upper half of first ventral dark, resembling specimen figured by Jordan and Seale (op. cit., p. 243, fig. 36), as does also dorsal. The band-like dark color on base of second dorsal and anal in all specimens varies from broad, distinct bands separated by light, narrow, basal seam from dark color of back to an extremely narrow, dark line —in some disappearing entirely. Very remarkable differences exist in the extension and intensiveness of longitudinal bands on root of caudal and on caudal (fig. 4, *a-d*), which complement figures of Jordan and Seale (op. cit., pp. 242, 243, figs. 35, 36, 37). In figure 4, *d*, all five bands extend onto caudal, forming blackish, more or less distinct stripes; in other specimens only middle band extends to border of middle of caudal, whereas 2 and 4 convene, forming arch on root of caudal. Intermediate between these is a specimen (fig. 4, *c*) in which band no. 2 is continued to near border of caudal, forming fine stripe. In specimen showing least coloration, band no. 4 is almost invisible on caudal root. On cheeks and part of body which lies before pectoral, between bands no. 3 and no. 4 and between nos. 4 and 5 are interspaces which show in alcohol intensive mother-of-pearl sheen, gradually disappearing toward rear. In several specimens interspace between bands nos. 3 and 4 is restricted on snout to a very narrow but distinct white line, extending from tip of snout to eye. Coloring of head and front part of body seen from above very characteristic. (See fig. 4, *e*.)

Suva, Fiji, shallow shore water, in coral blocks near Fiji Museum, 1926, H. S. Ladd.

In consideration of these many variations in coloring, I believe that a division of *Amia aroubiensis* and *Amia novemfasciata* into two species is an error. This separation is chiefly based on differences in coloring of root of caudal, which is not sufficiently constant for such determination. In the same manner, I believe also that *Amia exostigma* Jordan and Starks, which is described and figured from 8 specimens from Apia and Pago Pago, belongs to *Amia novemfasciata,* being only slightly and indistinctly colored specimens. This is proved by the identical position in both species of basal bands on second dorsal and anal, and the position of a longitudinal band, which is identical with the position of the middle band of *Amia novemfasciata,* even to the spot on root of caudal, corresponding to spot shown in figure 4, *d*. The largest specimen has an interesting abnormality of spines in the first dorsal (Pietschmann, Eine merkwürdige Flossenabnormalität bei Amia novemfasciata: Zool. Anz., vol. 84, p. 91, 1929).

Hynnodus (Scepterias) fragilis (Jordan and Jordan).

One specimen, 127 mm. long. Head 2.7, greatest height of body 4.6, length of caudal 4.1, distance from tip of snout to base of first dorsal 2.4, to beginning of second dorsal

base 1.6, to beginning of anal base 1.5 in body. Diameter of eye (horizontal) 2.2, length of snout 4, caudal 3.5 in head, breadth of interorbital 1.8 in eye. D VII, I/9, A II/9, scales in lateral line about 51.

Nearly all scales of body lost, only those in lateral line partly preserved. Second dorsal commences a little in front of pectorals, below end of first dorsal; end of ventral a little to rear of center of pectoral.

Honolulu, March 15, 1896, collected by the Austrian cruiser *Donau*. Not well preserved.

This specimen differs somewhat from the description of Jordan and Jordan, particularly in the formula of second dorsal, to which Jordan attributes 10 soft rays. Also they differ in the number of scales in the lateral line, the specimen I examined having 51, instead of the 54 mentioned by Jordan. The body of this specimen is relatively shorter than that described by Jordan. These differences are not sufficiently important to deserve naming a new species, but may be attributed to differences in growth.

Likewise I believe that the separation of this species from the genus *Hynnodus* into a new genus, *Scepterias,* is not justified, but that at most a subgenus is sufficient for these differences. According to the picture of *Hynnodus atherinoides* Gilbert (U. S. Fish Comm., Bull., 1903, vol. 23, pl. 79, p. 618, 1905), the specimen seems to be a young fish of a large species. This opinion is based upon the manner of pigmentation, which has a typical larval appearance. Perhaps, therefore, the specimen is also more slender.

Grammistes sexlineatus (Thunberg).

One spécimen 65 mm. long. Two broad lateral stripes, milky-white in alcohol, one from upper border of eye, one from lower edge of eye beneath angle of operculum along body; on caudal peduncle both stripes sharply converge, diminishing in size. In addition are two narrow fine lines, same color, one above broad stripes beginning halfway between eye and base of pectoral, extending to below middle of soft dorsal; the other line below broad stripes, beginning on border of opercle, extending to end of anal. End of maxillary white, white spot on edge of mouth. Oblique milky-white line on back border of operculum, smaller line beneath the first on branchiae. On middle of back longitudinal stripe from snout to beginning of first dorsal, continuing as fine line on front border of dorsal, only slightly narrower than two principal stripes. Small longitudinal stripe along middle of belly, from throat to vent, on base of ventral enlarged to broad spot. All stripes milky-white in alcohol.

Suva, Fiji, 1926, H. S. Ladd.

Upeneus multifasciatus (Quoy and Gaimard).

Two specimens, 211 mm. and 249 mm. long. Length of head 2.9 and 3, height of body 3.4 and 3.5 in body, diameter of eye 5.8 and 6.3 in head, 3.3 and 3.4 in snout. Interorbital breadth distinctly greater than diameter of eye (1:1.5) and contained 2.3 times in length of snout. Barbels reach in both specimens only a little behind edge of ventral. In lateral line I counted 31 scales, 2 of which are on caudal base. In both specimens characteristic, slightly slanting, white bordered, dark snout band plainly visible, and extends from front part of mouth to eye. Breadth equal to diameter of eye. About six dark, indistinctly bordered crossbars on body are hardly visible in alcohol—one be-

fore first dorsal, the second, very broad, beneath dorsal, the third between first and second dorsal, two below second dorsal, and one on caudal peduncle and caudal base.

Guam.

Fowler notes relative length of head and height of body (B. P. Bishop Mus., Bull. 38, p. 16, 1927) in a specimen 51 mm. long 1 1/5, for the relation from eye to head 3 1/3. In young stages evidently eyes are relatively much greater than in old ones, as is true in most species of fishes. For instance, *Sciaena aquila* (Pietschmann, Ann. Nat. Hofmus, Wien, vol. 21, p. 103, 1906). This is a new proof that the dimensions of the eyes have only a slight value for determination of species, because of their great variability.

Oxycirrhites (Cirrhitoidea) bimacula (Jenkins).

One specimen, 40 mm. long. In lateral line 43 scales, in transversal line 4, 9. Each dark crossbar and both black spots surrounded by a small white line (in life perhaps light-blue), ground color of body in alcohol light-brown.

It would seem that the difference between this species and *O. typus* Bleeker, as noted by Jenkins (U. S. Fish Comm., Bull., 1902, vol. 22, p. 489, 1904)—consisting principally in the length of snout—while very remarkable, is not of sufficient importance to justify making a new genus. I believe that the true relation would be shown were the species of Jenkins consigned to a subgenus of *Oxycirrhites*.

Pearl and Hermes Reef, T. T. Dranga.

Cirrhitus marmoratus (Lacèpede).

One specimen, 205 mm. long. Snout 3.2, interorbital 6, length of maxillary 2.3 in head. In other characters the specimen agrees with description by Jordan and Evermann (U. S. Fish. Comm., Bull., 1903, vol. 23, p. 452, 1905), with the addition of rusty-brown spots (in alcohol) on dark bands of body, spinous dorsal at base of soft dorsal and on anal fin. Light portion of body—especially gills, throat, and belly—seems to have been in life, rose-colored.

Pearl and Hermes Reef, April, 1927, T. T. Dranga.

Paracirrhites cinctus (Günther).

One specimen, total length 99 mm. Differs from description of Jordan and Evermann (U. S. Fish. Comm., Bull., 1903, vol. 23, p. 449, pl. 68, 1905) in having 51 perforated scales in the lateral line, behind which are 3 or 4 more rows on base of caudal. Length of head 2.9, greatest height of body 2.6, height of caudal peduncle 7.9 in length of body. Ground color in alcohol, orange with rosy glow on body, rose shade becoming more pronounced on sides and belly. Head and throat more brownish above. Snout, forehead, and neck to edge of dorsal covered with small, brown, ill-defined dots, which also border scales. On operculum in front of rear angle is distinct brownish-black spot having a faded appearance at rim, several smaller indistinct spots and streaks similar in color on cheeks and throat. On body are 5 blood-red crossbars, the first reaching to third dorsal spine, second starting behind the fourth spine and ending beneath the seventh, the third beginning below the eighth and extending to below the third soft ray, the fourth beginning beneath the fifth soft ray and continuing to the ninth ray, the fifth starting

under the last ray but one and occupying entire front half of caudal peduncle and having an indistinct brownish spot in the center. The rear of ventral, all of the soft anal, and lower part of caudal dark; pectoral shows but little brown.

Fish Market, Honolulu.

The position of the crossbars agrees so closely with the description of Jordan and Evermann that there is no doubt that the specimen belongs to this species, even though some of the coloring differs.

Microcanthus strigatus (Cuvier and Valenciennes).

Five specimens, 116 mm. to 142 mm. in total length. All have below the six longitudinal bands described by Jordan and Evermann (U. S. Fish Com., Bull., 1903, vol. 23, p. 376, 1905) a seventh one less distinct but clearly visible. This branches from the sixth, immediately in front of axle of pectoral, extending parallel with it below base of pectoral, where in some specimens it is only finely traced, to above center or end of base of ventral.

Honolulu Fish Market, 1928, Victor Pietschmann.

Heniochus acuminatus (Linné) (Pl. III, *A*, *B*).

One specimen, 71 mm. long. Height of body immediately in front of longest dorsal 1.4, head 2.6, length of caudal 4 in length of body, length of pectoral exactly equals length of head and is only slightly shorter than ventral, snout 2.6, diameter of eye 2.9 in head, dorsal (XI/27). In lateral line 58± rows of scales, those on caudal peduncle considerably smaller than others.

Suva, Fiji, 1926, H. S. Ladd. Caught under old coral blocks in flat shore-water in front of Fiji Museum.

The specimen differs in several characteristics from the illustration of this species by Jordan and Evermann (U. S. Fish Comm., Bull., 1903, vol. 23, pl. 55, 1905): the dark color on the snout reaches only slightly in front of the eye; the deep-black band between the eyes is continued across the eyes; between this and the first broad, black crossband of the body lies a small black spot on the back; the first and second black crossband of the body are both bent to the rear on the dorsal fin; the third crossbar, as shown by Jordan and Evermann (loc. cit.), being slightly lighter than the first two, is lacking altogether in the specimen here described, which in other respects is much darker.

Heniochus chrysostomus (Cuvier and Valenciennes) (Pl. IV).

One specimen, 89 mm. long. Height of body 1.5, length of head 2.7, length of caudal fin 3.9 in length of body, snout 2.9, diameter of eye 3.2, interorbital 3.8 in head, length of ventral slightly smaller than length of head, length of pectoral distinctly greater (1.1). Black oval spot with small white border on second half of anal within second dark crossbar of body very distinct, also longest dorsal and following spine, as well as ventral, strikingly darker than other bar.

Guam, H. G. Hornbostel.

This species is distinguished from *H. acuminatus* (Linné) not only by minor differences in proportions of the body, but especially in coloration, differences that appear also on the top of the head. *H. chrysostomus* has no dark crossbar between the eyes, but the upper part of snout and neck are light, except for a black longitudinal line passing along the middle of the head, starting at tip of snout and extending to the end of the first half of the interorbital. This line gradually becomes less distinct toward the rear. The first dark crossbar borders the eye, which is uniformly colored without a dark vertical bar like that in *H. acuminatus*. The forehead is almost smooth in the specimen here described (without front tubercle).

Scorpaenopsis gibbosa (Bloch and Schneider).

Two specimens, 86 mm. and 100 mm. long. Height of body 2.4 and 2.6 in body; diameter of eye 5.5 and 5.7, length of snout 3, breadth of interorbital 4.4 and 4.5 in head. I counted 47 longitudinal rows of scales in larger specimen extending to root of caudal, in caudal peduncle about 3 additional smaller ones; in the smaller specimen are only 46 rows in all. In both specimens broad, dark-brown stripe distinctly visible, rear border sharply defined, front border fading gradually toward front, back border extending from base of seventh dorsal spine obliquely downward to slightly behind upper axle of pectoral. In larger specimen this stripe has on both sides a whitish ring, which is dense beneath second to fourth dorsal spines. In both specimens ventral deep-black, becoming lighter toward base, in larger specimen having on it an indistinct lighter spot. Edge of ventral in both specimens bordered with broad white band. Similar coloring, black with broad, white edge, also on caudal. In front of base of caudal extending over belly is short white crossbar, in front of which is brownish crossbar becoming faded toward front. Marbling of body beneath soft dorsal indistinct. In smaller specimen bars on caudal are very dark brown and sharply defined. On pectoral, 7 longish black spots between rays, on larger specimen very distinct, on smaller specimen all but first ones faint.

Waikiki Reef, Oahu, 1927, Victor Pietschmann.

The number of scales seems quite variable in this species, also the coloring. The marbling is less distinct than shown by Jordan and Evermann (U. S. Fish. Comm., Bull., 1903, vol. 23, p. 469, fig. 206, 1905), but lies on the same part of the body. Also the interorbital space in both specimens is slightly narrower than in the animal described by Jordan and Evermann.

Sebastapistes coniorta (Jenkins).

Seven specimens, 33 to 68 mm. long. The number of the lateral rows of scales ranges from 53 to 55. Slight differences appear also in coloration, but the characteristic crossbars are in each specimen distinct and appear on identical parts of the body.

Pearl and Hermes Reef, T. T. Dranga.

Pterois radiata (Solander).

One specimen, 57.5 mm. long. Length of body 41.5 mm.; length of head 3.2 in total, 2.3 in body; greatest height of body 2.7 in body, 1.2 in head; diameter of eye 3.6; interorbital space 6.7 in head, 1.8 in eye; length of snout about equal to diameter of eye, 3.5 in head; cutaneous tentacle above eye slightly longer than twice diameter of eye, base of tentacle broad, diminishing in breadth toward top. About 60 rows of scales, 26 of

which are perforated by lateral line. Ground color of body in formalin very distinct but delicate pink to flesh color. The same coloring on snout, lower parts of cheeks, and throat. Dark brownish-black crossband noted and figured by Günther (Fische der Südsee, vol. 1, p. 8, pl. 56, fig. A, 1873-75) in this specimen distinct and in identical position but not so broad, so that interspaces very prominent; but three brown-bordered light bands figured on lower part of body in front of pectoral lacking. The dark bands continue entirely around body. Between first two bands on forehead, behind eyes, is short, dark crossband extending to middle of height of eye. Tentacle above eye black. The black color continues to border of eyeball, forming continuation of first dark crossband. Third band, which runs beneath base of first dorsal spine, also continued by oblong spot of about same breadth over middle of pectoral. Skin between rays of pectoral also black. Rays show ground color of body. Rear borders of anal, of soft dorsal, and of caudal black. Spots indistinctly visible on anal, soft dorsal, and caudal; on edge of caudal fin distinct. Said by natives to be very poisonous, according to notations of collector.

Reef in district of Papara, Tahiti, Society Islands, January, 1927, G. P. Wilder.

Dendrochirus chloreus (Jenkins).

One specimen, badly preserved. Length of body 44 mm. (Part of caudal lacking.) Deep-black spot behind upper edge of opercle, broad dark band along rear opercular border; a distinct oblique band extending from middle of second dark crossband on head toward lower part of pectoral base and lower basal part of this fin, there becoming broader and more distinct. Otherwise coloration typical.

Kaneohe Bay, May, 1928, T. T. Dranga.

Trigla kumu Lesson and Garneri.

One specimen 376 mm. in total length. On pectoral dark bluish-black spot, surrounded by distinct whitish small spots, all characteristic of this species. Longest dorsal ray longer than distance of front nostril from angle of operculum (1.1), pectoral extends only to below edge of dorsal, and is outlined by light-blue band about 5 mm. wide. Body is irregularly mottled with lighter color on upper half.

Near Napoopoo, west coast of Hawaii, October, 1922.

Heretofore this species has not been noted from Hawaii.

Thalassoma dorsale (Quoy and Gaimard).

One specimen, 186 mm. long. Coloring, which is in general typical of the species, shows the following differences: first indigo-blue crossbar extends on back from neck, overlapping beginning of spiny dorsal, in center of front half of crossbar interrupted by two light, vertical bars, reaching from light ground of belly across dark coloring, connected on lateral line by white crossband on which a part of dark crossband is isolated. This crossband, diminishing in size posteriorly, ends below the lowest pectoral rays, the following three crossbars in middle line of body; the last, indistinctly bordered, above middle line. A dark ovoid coloring appears on center of end of caudal, both lobes of caudal bordered by red streak, mentioned by Jordan and Seale ([U. S.] Bur. Fish., Bull., 1905, vol. 25, p. 307, 1906).

Guam, 1925, H. G. Hornbostel.

Thalassoma purpureum (Linné).

Thalassoma umbrostigma (Rüppell): Neue Wirbeltiere, Fische, p. 11, pl. 3, fig. 2, 1838.

Thalassomma berendti Seale: B. P. Bishop Mus., Occ. Papers, vol. 1, no. 4, p. 15, fig. 7, 1901.

Two specimens, 173 mm. and 279 mm. long.

Pearl and Hermes Reef, T. T. Dranga.

After comparing these two specimens with many individuals in the collections of Bernice P. Bishop Museum, I believe that *T. purpureum* and *T. umbrostigma* without doubt should be united in one species, as is tentatively proposed by Günther and Klunzinger, and that they represent only variation in coloration. This opinion is upheld by the fact that the type of coloring and drawing is identical, and further that these two specimens here referred to show transitions between the two forms. The larger specimen bears the typical coloring of *T. purpureum,* but it has at the beginning of the dorsal a distinct black spot, although with blurred edges, which reaches to the third dorsal spine; in the same manner, the axle of the pectoral is distinctly black. The smaller specimen shows in coloring much more clearly the type of *T. umbrostigma,* having at the beginning of the dorsal a distinct black spot about the same size and position as that of the other specimen, the axle of pectoral also being black, but in the anal fin are 3 spines and 11 rays as in *T. purpureum.* In both specimens the length of the head is considerably less than four times the total (3.6); in the smaller one it is distinctly greater than the greatest height of body (1⅛). It may be noted that all the specimens examined in the collections of Bernice P. Bishop Museum that have been determined as *T. umbrostigma* have 3 spines in the anal fin; further, that most of the specimens of *T. purpureum* show the black spot at the beginning of the spiny dorsal, some very faintly. It is possible that these differences are due to sex. Finally, I believe, *T. berendti* also is no more than a specimen of *T. purpureum,* which differs slightly in coloration from the normal.

Scaridea aërosa Jordan and Snyder.

A specimen of this species, 266 mm. long, described by Jordan and Snyder in 1906 ([U. S.] Bur. Fish., 1905, vol. 26, p. 215, 1906), in the Vienna collection has on the lower part of the gill covers two creamy-white vertical bars, both about one-half as wide as the diameter of eye. The first, below first half of eye, beginning about halfway between angle of mouth and lower opercular border; the second, a little behind the eye, beginning on line with angle of mouth, both reaching to lower opercular border, the second slightly curved and irregularly bordered. Upper border of eye blackish-brown, skin between first and second dorsal spine black, becoming lighter toward border of fin; also base between second and third spine black, the color blending with the black between first and second spine.

Honolulu.

Callyodon bennetti (Cuvier and Valenciennes).

One typical specimen, 242 mm. long.

Honolulu Fish Market, 1928.

As this species has a distinct posterior canine tooth, its position in the key of Jordan and Evermann for *Callyodon* (U. S. Fish Comm., Bull., 1903, vol. 23, p. 346, 1905) under the species without posterior canine tooth is an error, which is repeated in the description (op. cit., p. 352). The specimen shows three distinct white stripes on the belly, identical with the figure by Jordan and Evermann (op. cit., pl. 45), though in their description only two are recorded. The caudal fin of the specimen is slightly but distinctly luneate; their description and figure show it slightly rounded. About four indistinct traces of crossbands which appear on the upper half of body of the specimen are recorded in neither the description nor the figure of Jordan and Evermann.

Sicyopterus stimpsoni (Gill).

One specimen, 95 mm. long. Dark submarginal band on anal very distinct; upper lip and adjacent parts blackish. Body uniformly colored, without marks or spots.

Waiahole, Oahu, June 21, 1927, C. S. Judd.

Enneapterygius atriceps (Jenkins).

Three specimens, 228 mm., 235 mm., and 325 mm. long. In all specimens snout and lower part of head to throat black; black also from middle of eye to beyond upper edge of gill cover and as far as pectoral, on throat in front of ventral sharply bordered. As seen from above, light part of forehead extends with obtuse angle between eyes; beyond eyes two specimens have indistinct lighter stripe, which in one becomes broader toward belly, extending across dark color. Similar lighter crossbar in front of eyes. Intermediate specimen most brilliantly and distinctly colored, has two brownish red crossbands in front of pectoral, extending to level of lateral line, being separated by narrow, white interspaces; first crossband covering front part of gill. Six additional dark-brown crossbars, two being in front of anal: first extends beneath to belly, joined above with second, which reaches only to lateral line; between second and third bands is broken band with lighter center extending from lateral line across belly; third band broadest, with lighter center, its rear half only continued below lateral line across belly, the lower part also with lighter center; last three crossbands continued beneath lateral line across belly, where they have also lighter spots in center. Interspaces between crossbars below lateral line very light and give impression of light eye spots. Ground color of body in alcohol rose-red; on base of anal nine dark spots; first dorsal shows deep-black spot behind last spine, otherwise blackish; distinct black spots on base of second dorsal between each two spines, except last three, otherwise fins uncolored except very indistinct tiny dark dots on base of third dorsal. In largest specimen, which is longest preserved (1923), no differentiation is remarkable in coloration of fins, also bands of body in this specimen are very light. Smallest specimen corresponds in coloring with intermediate specimen, though lighter than it is in coloration, crossbars are more reddish-brown; black spot on first dorsal lacking and instead of basal spots of second dorsal has corresponding, narrow, blackish band.

Waikiki Reef, Oahu, in front of Marine Laboratory, from holes in coral blocks.

In their position the six crossbars correspond exactly in position with those figured by Jordan and Evermann (U. S. Fish Comm., Bull., 1903, vol. 23, p. 496, fig. 219, 1905). However, the description in this work disagrees

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with the figure in the dimensions of the body. When measured by me, the proportions of the illustration conform much more closely with those of the specimen here described than do those of the description. The differences are as follows:

	SPECIMENS IN BISHOP MUSEUM			JORDAN'S FIGURE	JORDAN'S DESCRIPTION
	1	2	3		
Head in body	3.7	4.3	4.3	3.4	3.25
Height in body	4.6	5.7	5.7	4.3	4.6
Diameter of eye in head	3.3	3.2	3.5		
Length of snout in head	4.9	4.2	4.1	4.7	3.4

Particularly the length given for the snout must be erroneous, for in all specimens examined it is smaller than the diameter of eye (also in Jordan's figure).

Salarias fasciatus (Bloch).

One specimen, 114 mm. long. Length of caudal 4.7 in total, dorsal XIV 21, anal 21, pectoral 14, C 3+13+2 or 3. Height of body in front of beginning of anal 4.2, head 4.6, length of pectoral from lower pectoral axle to rear tip of fin 4 in body, pectoral therefore slightly longer than head (1.1). Distance from beginning of dorsal to tip of snout 5.5, distance from beginning of anal to tip of snout 1.9 in body. Diameter of eye 3.7, postorbital 1.5, height of caudal peduncle 2.3, distance from beginning of dorsal to tip of snout 1.2 in head. Body high, strongly compressed, head moderately great with snout vertical in profile, above each eye thin, bifid, tiny tentacle, which is only slightly shorter than diameter of eye (1.1). On neck, shorter, undivided, unfringed tentacle, with lanceolate tip, broad side toward snout, length 1.7 in diameter of eye, inserted slightly behind middle of distance from eye tentacle to beginning of dorsal (1:1.2), front part of anal greatly elongated, its first three rays exceedingly filiform, the second the longest. Skin of fin between rays extends only slightly over first third of rays; also deeply incised between following rays. Only last rays of anal nearly entirely imbedded in skin.

On olivaceous ground color of body in alcohol, especially in its lower parts to base of anal, are indistinct, longitudinal, milky-white spots with blurred edges, becoming more distinct toward anal. Most of spots decidedly oblong, only lowest and middle rows above anal base composed of roundish spots. Belly milky-white. Head indistinctly spotted, borders of preoperculum and operculum with narrow, white edge. Tentacle of eye in its lower half light, becoming darker above. Chin and throat, except for light spot in middle, very dark, followed by two small, dark bands, one beginning at rear border of operculum and extending to base of ventral, the other also from operculum border to about middle of ventral. Dorsal dark. Slanting rows of long white spots extend obliquely upward through dorsal from base, the dark ground color of front part of dorsal composed of minute dark spots, densely placed, dark ground color of second half of fin solid. Above anal are three dark longitudinal rows; the first, immediately above base, more than twice as broad as either of others; interspaces between rows milky-white; outer part of anal becoming darker toward border, the edge being nearly black. Pectoral and ventral strikingly colored, with irregular cross rows of blackish, oblong spots. Similar cross row of dark spots extends above caudal, remainder of caudal also dark.

Suva, Fiji, in shallow water from coral blocks off shore, 1926, H. S. Ladd.

Between descriptions formerly made and this specimen the differences are considerable; for instance, in the shape of the second tentacle and in the number of fin rays, also in the length of rays in the forepart of the anal. Were it not that the coloring of this specimen is identical with that of *Salarias fasciatus,* a new local variety, if not a new species, would be in order. It may be that the differences are due to sex, but to reach this decision investigation of a large number of specimens would be necessary.

Enchelyurus ater (Günther).

Two specimens, 30 mm. and 31 mm. long.

Kaneohe Bay, near Coconut Island, in cavities of dead coral from the reef, December, 1927, Victor Pietschmann.

Tetrodon meleagris Lacépède.

One specimen 50 mm. long, length of body 1.3, length of head (tip of snout to middle of gill slit) 2.4, distance of tip of snout from beginning of dorsal base 1.4, from anal base 1.3, distance of lower end of pectoral axle from back 3.3[2] in body. Length of snout 1.8; eye, which equals the interorbital, 3.1; breadth of pectoral base 2.8, of dorsal base (measured from first extension in contour) 2.9, of anal base 4.1 in length of head. The specimen is covered with numerous bluish-white spots, so that on greater part of body ground color appears as coarse mesh. Spots on head more or less roundish, also on caudal peduncle and behind pectoral. On remainder of body spots oblong, some of them irregular in form; those on belly beneath pectoral particularly long and narrow, forming rather regular longitudinal rows. Ring of white spots around eyes distinct as shown by Garrett and Günther (Fische der Südsee, vol. 3, pl. 174, Hamburg, 1909-10). Spots on head are in alcohol light-blue, bordered by very narrow dark-blue lines. Fins uniformly white.

Waikiki Reef.

Tetrodon immaculatus Bloch and Schneider.

Two specimens, 67 mm. and 210 mm. long. In the longer distance from top of snout to gill opening 2.3 in body, caudal length 2.6; caudal slightly longer (1.1) than distance of root of caudal from beginning of dorsal base; distance of dorsal from base of caudal 1.4 in caudal length, length of snout slightly longer than half distance of top of snout from gill opening: shows coloring of juvenile form of this species (described by Bleeker as *Crayracion manillensis*) with the exception that the olive-green stripes are much more numerous than in Bleeker's figure (Atlas ichth., vol. 5, pl. 208, fig. 2) and are also visible on the very dark back. In smaller specimen, which is very dark, dorsal has 10 and anal 11 rays; head (distance of top of snout to gill opening) 2.5; length of caudal 3.3 in body; length of snout 2.2 in head; in this specimen also caudal is slightly longer than distance of base of caudal from beginning of dorsal base (1.2); distance of dorsal from caudal base 1.8 in length of caudal.[3]

Even in view of the fact that *Tetrodon immaculatus* has a great variability, the smaller specimen at first view appears quite different from the de-

[2] I take this distance instead of height of body because as all balloon fishes are able to extend greatly the belly it is impossible to take exact measurements of height.

[3] Colors of this specimen will be described in a paper on juvenile stages of Pacific fishes, which I hope soon to prepare.

scriptions and also from the larger specimen, but an examination proves its identity with this species.

Suva, Fiji, 1926, H. S. Ladd.

Tetrodon nigropunctatus Bloch and Schneider.

One specimen, 186 mm. long. Length of caudal 3.4; head 2.6 in body; pectoral equals length of snout 1.9 in head; eye 6.2; head of caudal peduncle 2.8 in head; border of orbital slightly raised; caudal considerably longer (1.3) than its distance from base of dorsal. Coloring very remarkable: ground color in alcohol drab-brown, on back becoming distinctly dark, belly slightly lighter; on body roundish spots, indistinctly bordered, hardly visible; in ground color are irregularly distributed deep-black, roundish spots of various sizes, the largest about a third diameter of eye; tips of spines extruding from skin white, giving the specimen the appearance of being covered with tiny white spots; eyes surrounded by dark-brown rings indistinctly bordered; in the same manner snout and environs of pectorals dark-brown; border of mouth black, also base of pectoral and vent, which is formed like a bent furrow, immediately in front of base of anal; of equal darkness are tentacles of nostrils; silvery-white band extends horizontally over forehead, beginning at snout and ending beneath eye, its breadth slightly smaller than diameter of eye, tentacles sharply contrasted.

Guam, H. G. Hornbostel.

In coloring and dimensions this specimen differs in several characteristics from all previous descriptions. Garrett and Günther (Fische der Südsee, p. 468) notes for border of orbital "not raised," and "caudal fin and its distance from base of dorsal equal." Also in no description is mentioned the silvery-white band on the forehead. Even so, I believe that the differences listed in the above description are insufficient to create a new species. To determine whether this represents a local variety, more extensive material for comparison is necessary. If the differences in ample material are found to be constant, the determination of a new variety is justifiable.

Antennarius nummifer (Cuvier).

Antennarius drombus Jordan and Evermann: U. S. Fish. Comm., Bull., 1902, vol. 22, p. 207, 1903.

Antennarius nexilis Schneider: U. S. Fish. Comm., Bull., 1902, vol. 22, p. 537, pl. 13, fig. 23, 1904.

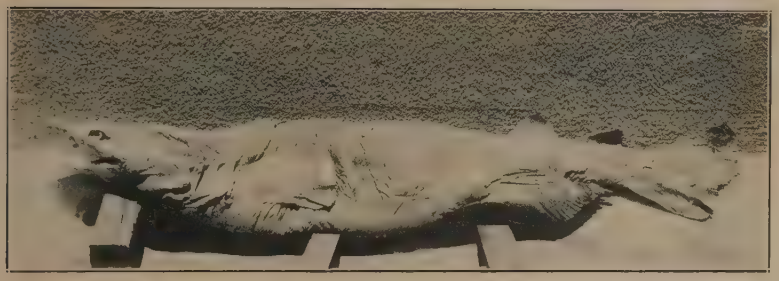
One specimen 61 mm. long. Brown, becoming rose-red on belly, particularly toward throat. In ground color numerous indistinct darker spots and marblings, several of which are edged with lighter. On lighter part of belly these darker spots are very distinct. Base of cuticular flaps of body characteristically colored by small, very dark, blackish-brown spots bordered by whitish lines. In same manner excretory ducts of mucous tubes in lateral line darker. On both sides of isolated third dorsal spine whitish crossbar extends vertically. About equal with diameter of eye. Beneath second half of soft dorsal, roughly below fifth to seventh dorsal, is larger, dark, light-bordered, irregular spot, its longest diameter 1¼± diameter of eye. On soft dorsal 3 longitudinal rows of dark-brown dots, on anal 2. Edges of both fins white. Basal half of pectoral same color as body, rear half becoming lighter. In rear half two rows of dark-brown dots with broad, white edges extend across fin. Dark-brown dots on caudal fin arranged in five indistinct crossbands, border of caudal white.

Waikiki Reef, 1923.

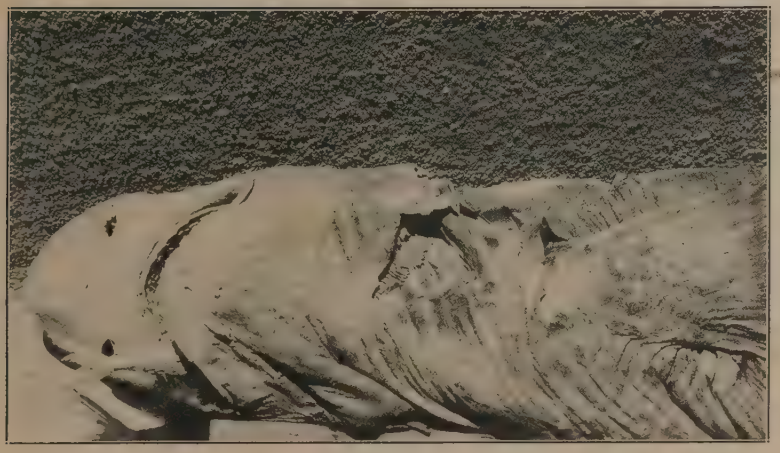
As in *Antennarius commersonii* (Lacépede), in this species the coloring and design has, I believe, an extremely great variability. To make a new species, *Antennarius drombus,* as is done by Jordan and Evermann, which by Jordan and Seale is considered doubtful ([U. S.] Bur. Fish., Bull., 1905, vol. 25, p. 438, 1906), is not justified by the facts. As to coloring, this specimen is halfway between *Antennarius drombus* and *Antennarius nexilis.* Aside from coloring there is no important difference in the two species, which are also from the same locality (Waikiki, near Honolulu), permitting the conclusion that they are differently colored specimens of the same species.

Widely distributed, since the area of *Antennarius nummifer* extends to the coast of Africa. I am not without doubt that a fish figured by Bleeker (Atlas ichth., vol. 5, pl. 197, fig. 2) under the name *Antennarius coccineus* belongs also to this species. On the other hand, I believe, contrary to the opinion of Jordan and Seale (loc. cit.), the type of this species described by Lesson and Garneri (Voyage de la Coquille, pl. 16, fig. 1) may be easily identified as *Antennarius nummifer,* except that the red color in this figure appears to be slightly exaggerated and the spots and marblings so indistinct as to be hardly visible. These differences, if not due to an inexact drawing, may be accounted for by the great variability of the entire genus, which must be restricted to a small number of widely distributed species. Also *Antennarius nummifer* (Day) (Fishes of India, p. 272, pl. 59, fig. 2, 1878-88) belongs to the species here described.

The significant factor in deciding whether all these should be included in one species is the position of the spots on the head, which are visible in all the figures—differing in size and number, but all in the same position.



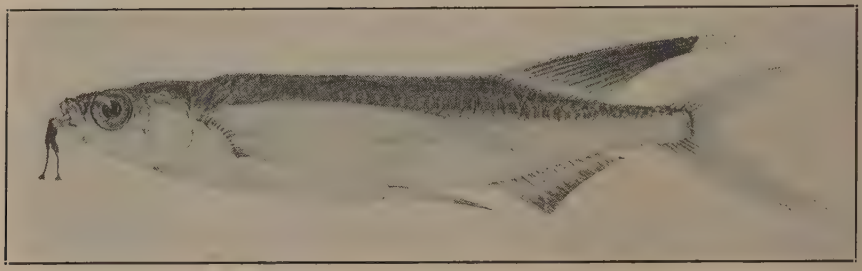
A



B

VIEWS OF ECHINORHINUS COOKEI, NEW SPECIES: *A*, SHOWING LATERAL LINE, THE WHITE BORDER ON PECTORAL FIN DUE TO IMPERFECT PRESERVATION OF THE SKIN; *B*, HEAD AND FRONT PART AS SEEN FROM BELOW. CARANGOID IN MOUTH; SCARS ON THE THROAT PROBABLY CAUSED BY CEPHALOPODS.
(PHOTOGRAPH BY KENNETH P. EMORY.)

A

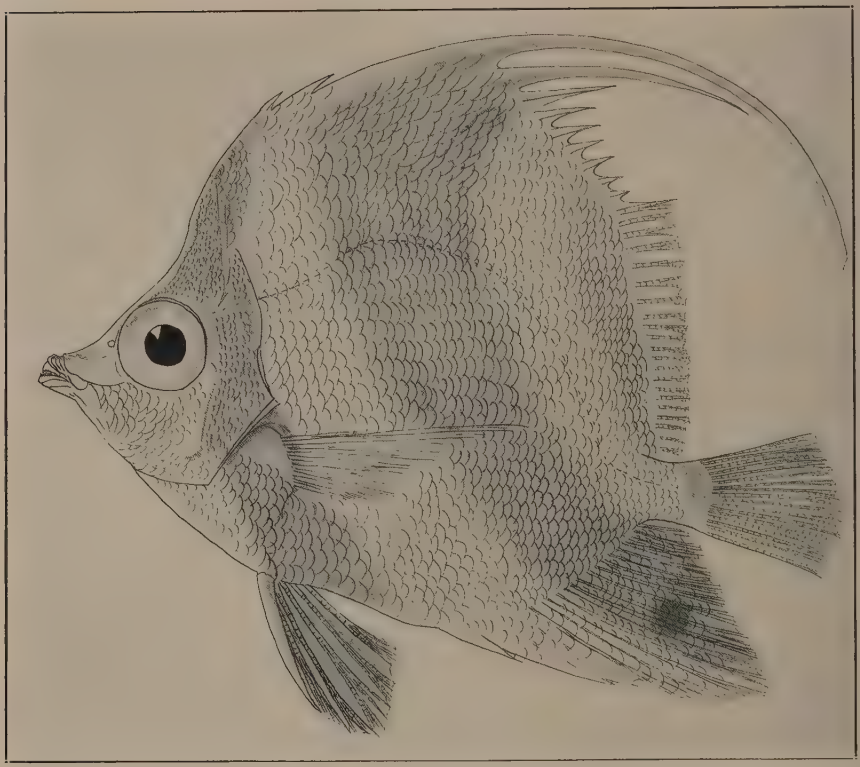


B

A, CYPSELURUS GREGORYI, NEW SPECIES; *B*, PTENONOTUS MELANOGENEION, NEW SPECIES. (DRAWN FROM TYPE SPECIMENS: *A*, BY KENJO YOSHITO; *B*, BY MAXMILIAN HOLLY.)

A *B*

HENIOCHUS ACUMINATUS (LINNAEUS): *A*, SIDE VIEW; *B*, HEAD AS VIEWED FROM THE FRONT. (DRAWN BY YOSHITO KENJO.)



HENIOCHUS CHRYSOSTOMUS (CUVIER AND VALENCIENNES). (DRAWN BY KENJO YOSHITO).